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IS 10106-4-6 (1986): Packaging code, Part 4: Packages,
Section 6: Fabrics/Textiles [TED 24: Transport Packages]



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Bhartrhari—Nitiśatakam

“Knowledge is such a treasure which cannot be stolen”

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IS : 10106 (Part 4/Sec 6) - 1986

Indian Standard

PACKAGING CODE

PART 4 PACKAGES

Section 6 Fabrics/Textiles

UDC 621.798.2 : 677.074



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INDIAN STANDARDS INSTITUTION
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI 110002

Indian Standard

PACKAGING CODE

PART 4 PACKAGES

Section 6 Fabrics/Textiles

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(*Continued from page 1*)

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PACKAGING CODE

PART 4 PACKAGES

Section 6 Fabrics/Textiles

0. FOREWORD

0.1 This Indian Standard (Part 4/Section 6) was adopted by the Indian Standards Institution on 15 July 1986, after the draft finalized by the Packaging Code Sectional Committee had been approved by the Marine, Cargo Movement and Packaging Division Council.

0.2 The packaging code is being issued in the following parts, each having one or more sections:

- Part 1 Product packaging
- Part 2 Packaging materials
- Part 3 Ancillary materials
- Part 4 Packages
- Part 5 Packaging operations
- Part 6 Storage and transportation
- Part 7 Packaging machinery

0.2.1 This section deals with fabric/textile packages. Fabric/textile materials for making packages are covered in Part 2/Sec 4 of the code.

0.3 Packages, namely, bags, sacks and wrappings are made from a variety of materials, the basic ones being jute, cotton and high density polyethylene fabric. The uses, fabrication, marking, closing, etc, of these packages are described in this section.

0.4 In the preparation of this section of the code, assistance has been derived from the following publications:

- a) BS : 1133, Section 9-1967 'Packaging code, textile bags, sacks and wrappings', published by the British Standards Institution (BSI).
- b) 'Defence Services packaging code', issued by the Ministry of Defence, Government of India.

1. SCOPE

1.1 This standard (Part 4/Sec 6) deals with packages, namely, bags, sacks and wrappings made of fabric/textile materials.

2. JUTE

2.1 General — Jute in the form of bags, sacks and wrappings is extensively used as a packaging material for a wide variety of commodities, particularly at stages prior to retail sale. Jute bags, sacks and wrappings have numerous advantages.

2.2 Terminology — The definitions of terms relating to jute and jute products are given in IS : 5476-1969*.

2.3 Material — Jute bags, sacks and wrappings are made from a wide variety of clothes as described in Part 2/Sec 4 of the code.

2.4 Fabrication of Bags and Sacks

2.4.1 Seaming and Hemming — The seams and hems recommended in this code are shown in Table 1.

TABLE 1 TYPES OF SEAMING AND HEMMING

TYPE OF SEAM OR HEM	TYPE OF STITCHING (See TABLE 2)	DIAGRAM OF SEAM OR HEM (SHADED LINES-CLOTH; PLAIN LINES-STITCHING)
A <i>Plain seams</i> — Sewn through two thicknesses of cloth. Bag turned after sewing.	Union	
B <i>Plain seam double sewn</i> — Sewn through two thicknesses of cloth. Bag turned after sewing.	Union	

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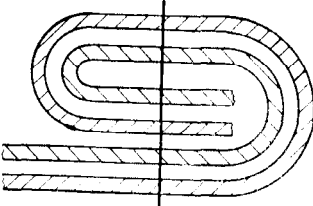

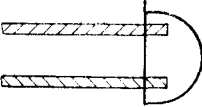
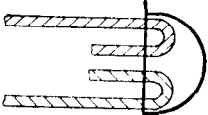
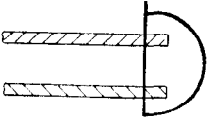
*Glossary of terms relating to jute.

TABLE I TYPES OF SEAMING AND HEMMING — *Contd*

TYPE OF SEAM OR HEM	TYPE OF STITCHING (See TABLE 2)	DIAGRAM OF SEAM OR HEM (SHADED LINES-CLOTH, PLAIN LINES-STITCHING)
C <i>Counterlaid seam</i> — Sewn through two thicknesses of cloth. Bag turned after sewing.	Union	
D <i>Counterlaid seam double sewn</i> — Sewn through four thicknesses of cloth. Bag turned after sewing.	Union	
E ' <i>M</i> ' seam — Sewn through four thicknesses of cloth. Bag not turned after sewing. (This seam is used for paperlined bags and for certain unlined bags.)	Lockstitch or Union	
F ' <i>N</i> ' seam — Sewn through three thicknesses of cloth. Top cloth selvedge, bottom cloth raw edge. Bag not turned after sewing.	Union	

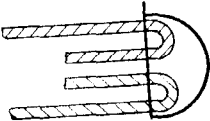
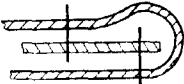
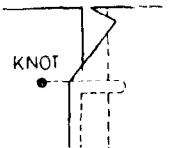
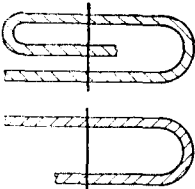
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TABLE 1 TYPES OF SEAMING AND HEMMING — Contd

TYPE OF SEAM OR HEM	TYPE OF STITCHING (See TABLE 2)	DIAGRAM OF SEAM OR HEM (SHADED LINES-CLOTH; PLAIN LINES-STITCHING)
G <i>Hem seam</i> — Sewn through six thicknesses of cloth. Bag not turned after sewing.	Union	
H <i>Fold-over seam</i> — Sewn through four thicknesses of cloth. Bag not turned after sewing. (This seam is used for paper-lined bags and for certain unlined bags.)	Lockstitch or Union	
J <i>Overhead seam or selvages</i> — Sewn through two thicknesses of cloth. Bag not turned after sewing.		
K <i>Overhead seam on raw edges</i> — Sewn through four thicknesses of cloth. Bag not turned after sewing.	Overhead	
L <i>Herakles seam on selvages</i> — Sewn through two thicknesses of cloth. Bag not turned after sewing.	Herakles	

(Continued)

TABLE 1 TYPES OF SEAMING AND HEMMING — *Contd*

TYPE OF SEAM OR HEM	TYPE OF STITCHING (See TABLE 2)	DIAGRAM OF SEAM OR HEM (SHADED LINES-CLOTH; PLAIN LINES-STITCHING)
<p><i>M</i> <i>Herakles seam on raw edges</i> — Sewn through four thick- nesses of cloth. Bag not turned after sewing.</p>	Herakles	
<p><i>N</i> <i>Splay seam</i>—Cloth selvages laid together, one selvage overlapping about half an inch; then sewn through the two thicknesses of cloth on a lockstitch machine, leav- ing the 12 mm protruding cloth, which is then folded over and stitched by a horn machine, again through two thicknesses of cloth. The bag is then turned.</p>	Lock-stitch	
<p><i>Vent</i> — If vented at mouth to facilitate filling of the sack, sewing is sometimes finished off by forming bar across the sewing (that is sewing runs 50 mm towards centre of bag and then back and 50 mm to other side). <i>See Fig. 1.</i></p>		 <p style="text-align: center;">VENT AND BAR</p>
<p><i>P</i> <i>Hemming:</i></p> <p>a) On raw edges at mouth; cloth turned in twice.</p> <p>b) On selvages at mouth; cloth turned in once.</p>	Union	

2.4.2 Stitching and Twine — The stitching recommended in this code and the twine to be used are given in Table 2. The sewing twine used may be of jute, cotton, flax or hemp according to the type of sewing machine used and strength of seam required. Jute and hemp twines may be tarred.

TABLE 2 STITCHING AND TWINE

Sl No.	TYPE OF STITCHING	See FIG. No.
i)	<i>Union</i> — 2 thread chain stitch; 3 fold (ply) cotton twine of 74 tex (except where other cotton or twine of other material is specified for extra strength), bags turned after sewing except when otherwise stated. 3 to 4 stitches per 25 mm.	2
ii)	<i>Herakles</i> — Overedge stitch. The twine used should be as follows: For hessian bags: not lighter than 3-ply 3 kg jute twist, 3 stitches per 25 mm. For twills and tarpaulins: not lighter than 4-ply 3 kg jute twist, 3 stitches per 25 mm.	3
iii)	<i>Overhead</i> — Overedge stitch. The twine used should be as follows: a) For hessian bags: not lighter than 3-ply 3 kg jute twist, 2½ stitches per 25 mm. b) For twills and tarpaulins: not lighter than 4-ply 3 kg jute twist, 2½ stitches per 25 mm.	4
iv)	<i>Lockstitch</i> — The twine used with heavy industrial lockstitch machines should be as follows: a) For hessian bags: not lighter than 3-ply 3 kg jute twist, not less than 2 stitches per 25 mm. b) For twills, tarpaulins and paper-lined bags: not lighter than 4-ply 3 kg jute twist, not less than 2 stitches per 25 mm.	5
v)	<i>Hemming</i> — Chain stitch [see (i) above]. The cotton twine used should be not lighter than the following: a) For hessian: 3 fold (ply) cotton twine of 30 tex, 2½ stitches per 25 mm. b) For twills and tarpaulins: 3 fold (ply) cotton twine of 74 tex, 2½ stitches per 25 mm.	2

2.5 Marking — Jute sacks and bags may be marked, by machine or by hand, in one or more colours, in types and designs to suit user's requirements.

2.6 Closing — Closing may be done by hand or by machine stitching (see Fig. 6A, 6B, 6C and 6D) with wire ties or twine (see Fig. 6E). The machine stitching methods shown in Fig. 6B is the most suitable where labels have to be attached.

2.6.1 Bags Closed by Hand Stitching (Fig. 6A) — The bags should be rolled at the mouth to form two ‘ ears ’ and oversewn with a packing needle. There should be adequate free cloth above the contents of the bag. The mouth is then stretched to its full width and rolled down tight on the contents, twisting out an ‘ ear ’ at each end. The method of sewing is as follows:

“One ‘ear’ is securely knotted at its base and the rolled mouth of the bag is then sewn by over stitching, finishing with a loop knotted round the base of the other ‘ear’. Normal type straight packing needles are used with jute or hemp twine.”

2.6.2 Bags Closed by Machine Stitching (Fig. 6B) — Bags are fed into the machine so that the line of stitching is not less than 25 mm from the edges of the fabric at the open end of the bag. Bag stitching machines have ‘ feed ’ plates similar to those fitted on normal sewing machines, but hand or mechanical (for example, conveyor) feed through the bag closing machine is necessary.

2.6.3 Wire Tying (and Wire-cum-Twine Tie) (Fig. 6C) — Bags closed by wire tying should be bunched at the mouth and tied with a wire tie by means of a wire tying tool. There should be adequate free cloth above the contents of the bag. The bunch is made and a wire tie, made from 1.3 mm (16 SWG) wire and looped at each end, is placed round this bunch approximately 11 cm from the top of the bag. The loops are brought together and the hook of the wire bag tyer is placed in these loops. By pulling on the handle of the tool the loops are locked together in a spiral and a secure fastening is made. The end of the tie should be laid flat along the bag.

2.6.4 Bunch Tying with Twine (Fig. 6D) — Bags are bunched at the mouth and tied by twine. There should be adequate free cloth above the contents of the bag. The bunch is made and the twine, knotted at the end is passed through both thickness of cloth, by means of a standard type packing needle, wound twice around the bunch approximately 11 cm from the top of the bag, passed again through both thicknesses of cloth and securely knotted.

2.7 Liners — Where protection is required against sifting of finally powdered materials, or against contamination of the contents or of other materials by the contents, loose liners or lined bags should be used; paper liners should be in accordance with Part 2/Section 2 of this code. Types of liners generally available are shown in Table 3.

2.7.1 In the case of loose liner bags, the top of the liners should be folded over and closed before the jute bag or sack is closed. Loose liner bags should be not less than 75 mm longer than the outer bags to allow the folding over, and not less than 25 mm wider to prevent the inner bag bursting. In cases where air should not be excluded from the contents, as with certain glues, a double jute bag may be preferable.

2.8 Economical Dimensions of Bags and Sacks

2.8.1 The flat dimensions of a bag/sack suitable for carrying given weight of commodity are generally decided by trial and error, by reference to previous experience or by simple calculations. The holding capacity of bag of given dimensions depends on the bulk density of the material packed and the degree of tightness of packing adopted. Although various combinations of length and width dimensions are possible factors, such as, maximum available width of fabric, convenience of filling, handling and storage of filled bags and the performance of the filled bags in drop tests are to be considered before deciding the ultimate dimensions of bags for particular end-use.

2.8.2 *Drop Test* — The filled bags shall be subjected to sequential 4 drops — one each on either side and the other two on the butt-end side. The drop height shall be 1.2 m. It is optional to subject the bag to two additional drops — on the top and bottom side from the same height.

2.8.3 *Length to Width Ratio* — Generally, length-width ratio of bags is adjusted between 1.3 to 1.7. When a filled bag is dropped from a height, the bottom layer of the bag strikes the floor below. As a result the material inside receives an upward thrust which causes momentary compression in the material at the lower layer. Also the weight of the material above opposes this upward movement of the material from below. There is thus a tendency of accumulation of material at some intermediate position. This generates a lateral pressure on the sides of the bag which ultimately attains a contour shape. Since the side seams of the bag generally constitute the weakest part, a damage would result when the lateral pressure exceeds the side seam strength of the bag. A tearing of the bag would thus occur along with edge of the side seam. The higher length to width ratio between 1.3 and 1.7 will no doubt yield economy in fabric but will also make the bag narrower. Investigations have shown that a narrower bag (length-width ratio of 1.7) would be more susceptible to damage in butt-end drops compared to wider bag (length-width ratio 1.3) on account of the reduced area of contact with the striking surface which leads to increased stress concentration on the side seams. It is, therefore, recommended to determine length-width ratio based on the analysis of butt-end drops in order to fix the flat dimensions of bag. An extra length of about 5 cm to 15 cm may be allowed for attaining the necessary loose packing conditions and for proper closing of the bag.

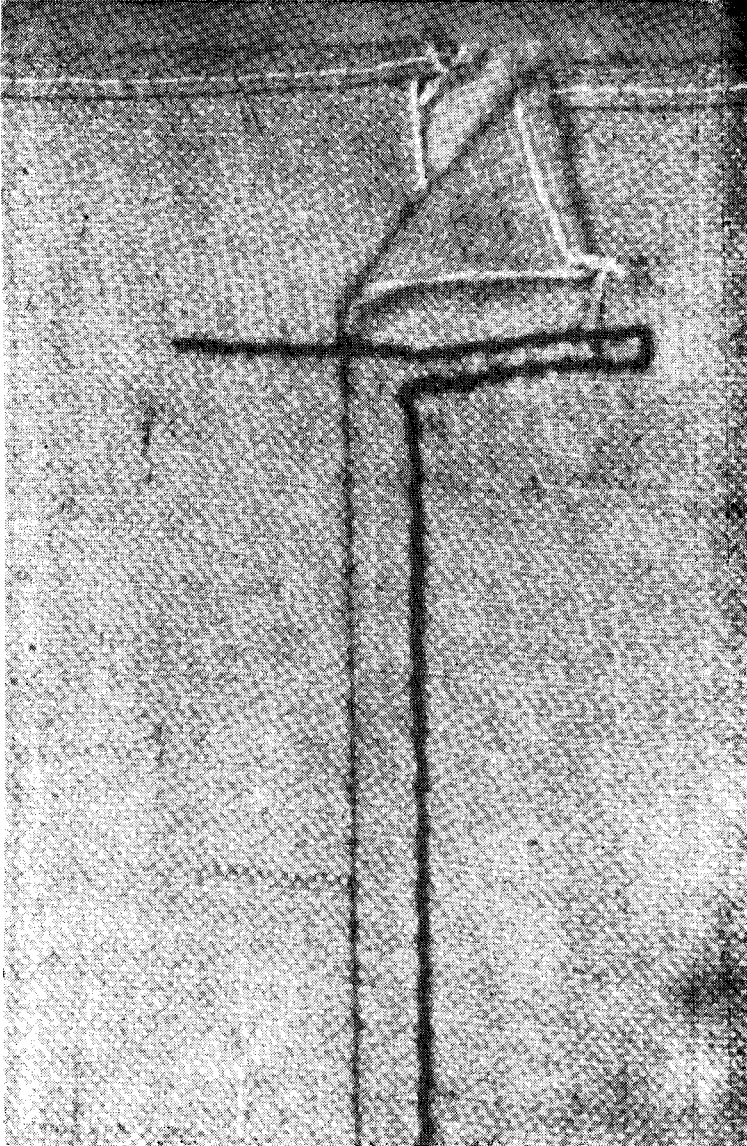
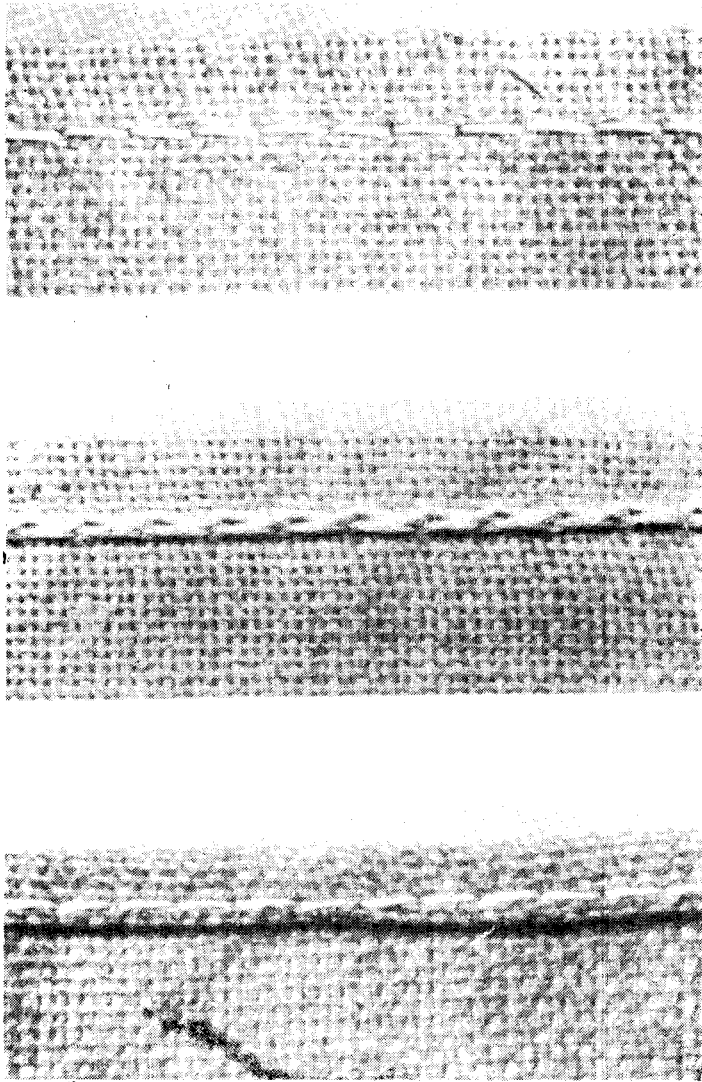
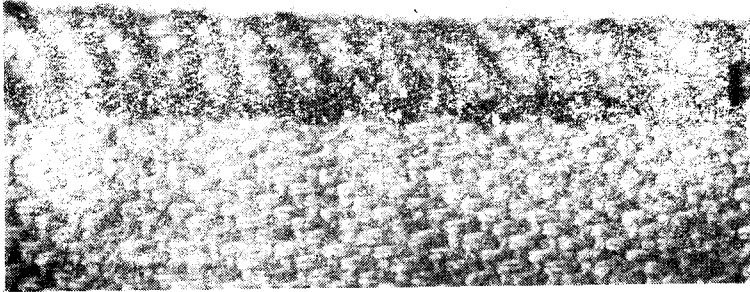
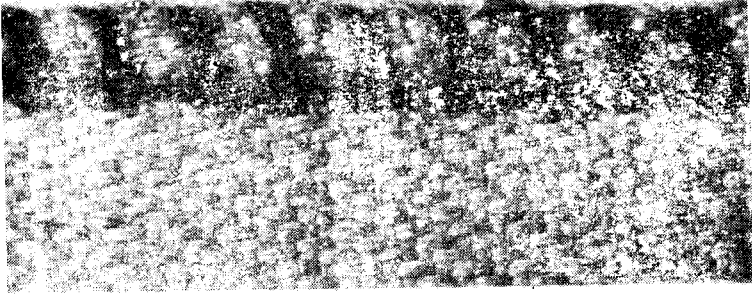


FIG. 1 SPLAY SEAM, BAR AND VENT



The top most photographs show the appearance on both sides of the stitching and the bottom photograph illustrates the use of union sewing in hemming hessian.

FIG. 2 UNION SEWING



Both sides of the stitching are shown.

FIG. 3 HERAKLES, OVEREDGE STITCH

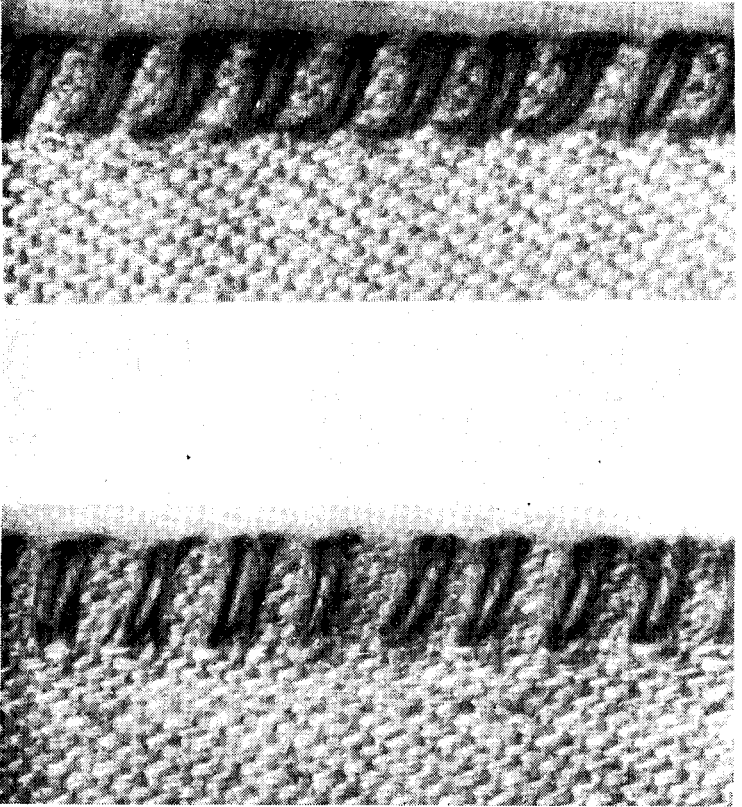
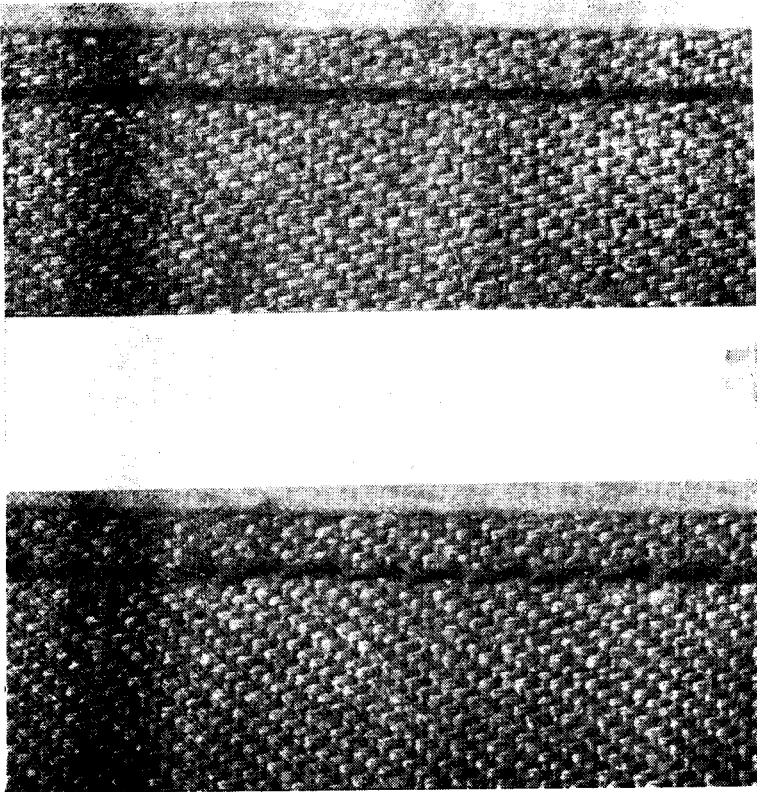
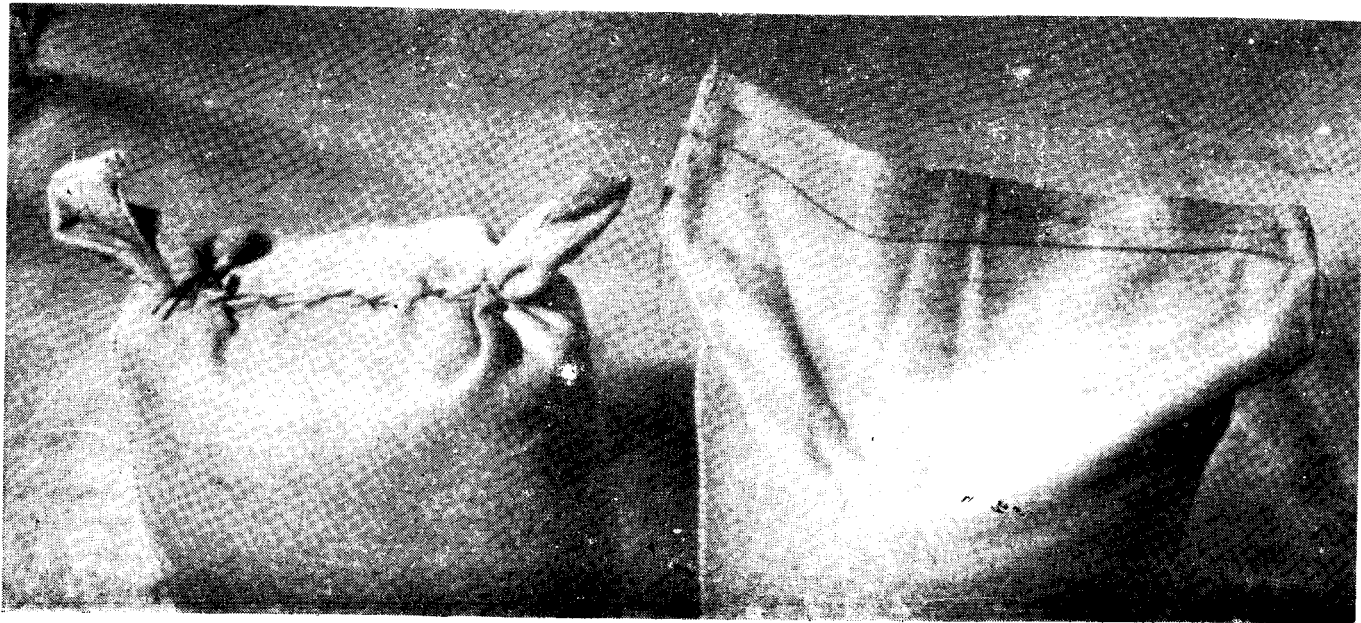


FIG. 4 OVERHEAD, OVEREDGE STITCH



Both sides of the line of sewing are illustrated.

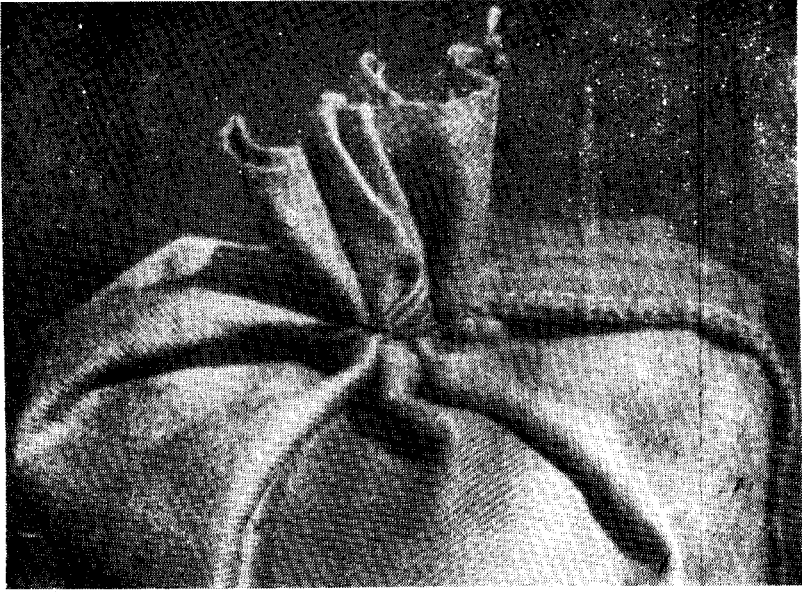
FIG. 5 LOCKSTITCH



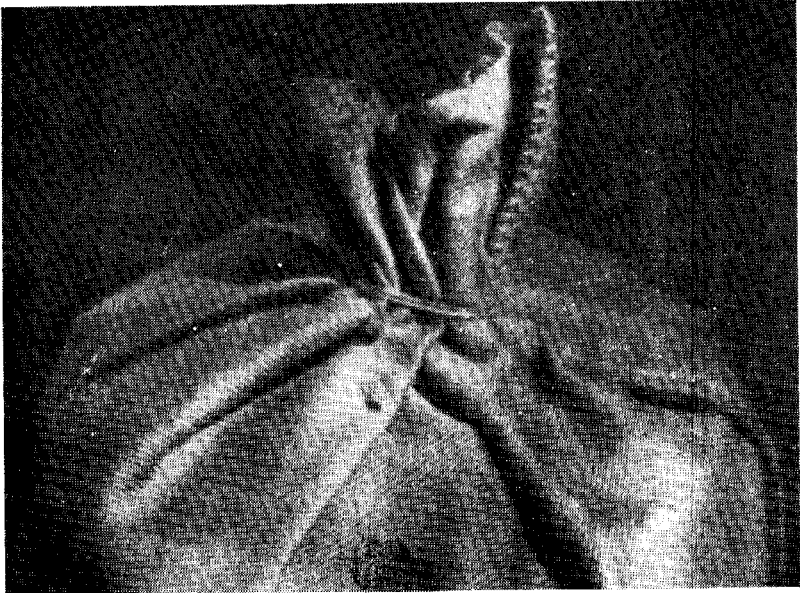
6A Hand-Closed

6B Machine-Closed

FIG. 6 CLOSING JUTE BAGS — *Contd*

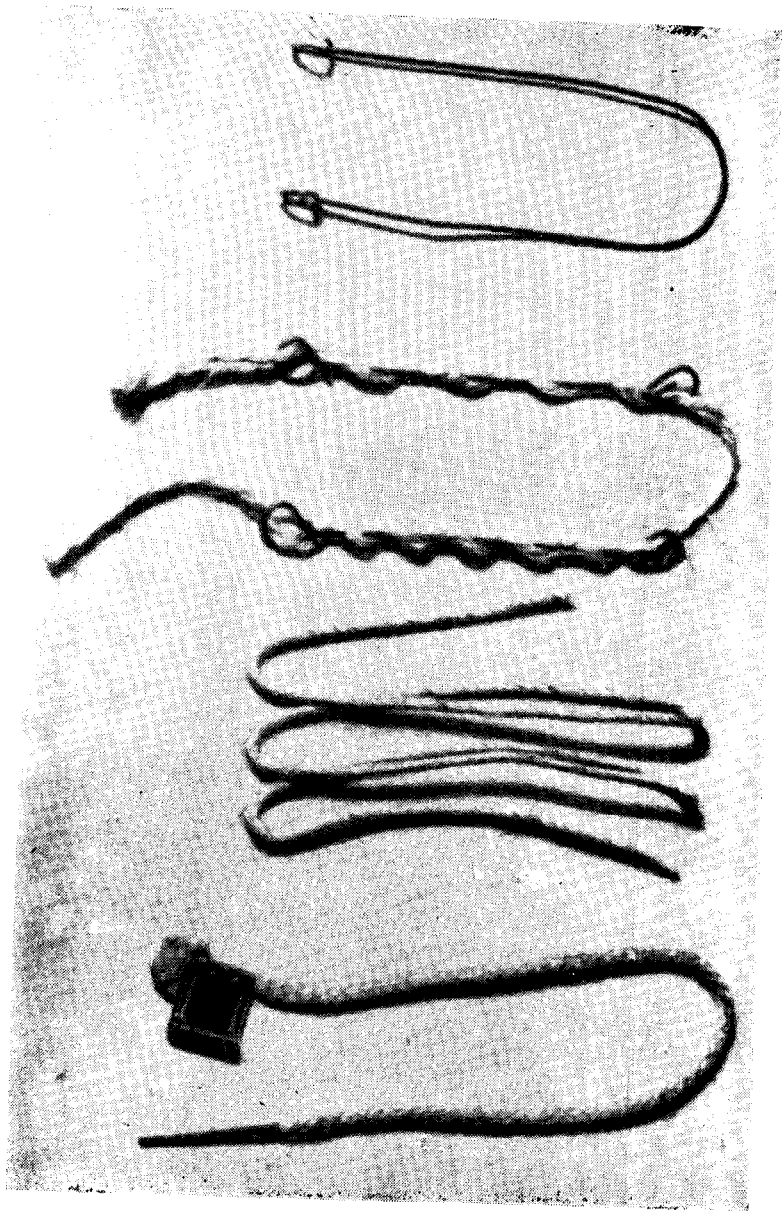


6C Wire Tying



6D Twine Tying

FIG. 6 CLOSING JUTE BAGS - *Contd*



6E Ties

FIG. 6 CLOSING JUTE BAGS

TABLE 3 JUTE BAG LINERS

(Clause 2.7)

Sl. No.	LINER	USAGE
(1)	(2)	(3)
i)	Jute fabric combined with crepe or plain paper (united by bitumen or other water-resisting adhesive), generally known as ' paper-lined '	For protection against moisture and sifting. This is used for packing such commodities as nitrates and other crystalline chemicals, pigments, fertilizers, etc, provided the contents are not susceptible to contamination by the adhesive
ii)	Loose crepe kraft paper liners (waxed if required)	For general protection against sifting where moisture is not detrimental
iii)	Loose kraft or creped kraft paper liners (1 waxed, 1 plain)	For use under severe climatic or other conditions where jute fabric and paper united by bitumen or other adhesive is unsuitable
iv)	Loose kraft paper liners. Each liner made from one or more plain kraft plies and one or more union kraft plies, the number and position of the ' Union ' plies in the liner depending on the protection required	<p>a) Liners with external ply (or ply in contact with the outer package), of union kraft when it is desired to prevent contamination of products by weather or contact with other materials in transit</p> <p>b) Liners with internal ply (or ply in contact with the contents) of union kraft when it is desired to prevent contents from contaminating other products during transit</p> <p>c) Liners with one or more plies of union kraft as the central plies with the external and internal plies of plain kraft when the liner is used to reduce permeability of the package</p>
v)	Liners, either loose or bonded to the sack made from plastics film, such as polyethylene or polypropylene.	For specific purposes, such as conveyance of certain chemicals, pharmaceuticals, fertilizers, etc[see IS : 7406 (Part 1)-1972* and IS : 7406 (Part 2)-1980*]

*Laminated jute bags for packing fertilizers:

Part 1 Laminated bags manufactured from 407 g/m²; 85 × 39 tarpaulin fabric.Part 2 Laminated bags manufactured from 380 g/m²; 68 × 39 tarpaulin fabric.

2.9 Packing — Jute bags are packed in bales. (For details *see* IS : 2873-1969* .)

2.10 Handling and Storage — Handling may be done by manual or mechanical methods. The method of storage is similar as for jute materials (*see* 2.8 of Part 2/Sec 4 of this code).

3. COTTON

3.1 General—Cotton bags are usually regarded as complementary in their use to jute bags or sacks. The bags are durable and can frequently be used more than once, either for the purpose for which they were intended or for other purposes.

3.2 Materials — Cotton bags are usually made from cotton fabric of plain weave, but sometimes twill weave is also used. Details are given in Part 2/ Sec 4 of this code.

3.3 Types and Uses

3.3.1 Types — Cotton bags are of the following two types:

- a) Bags made with raw or selvedge tops, and
- b) Bags made with hem tops fitted with drawstring closures.

3.3.2 Uses — Bags with raw or selvedge tops are used for packaging grains, seeds, pellets, fertilizers, animal and poultry foods and all fine powdered and granular products.

Bags with drawstring closures are used for packaging small parts such as engineering spares, metal or plastics, etc. This type of bag is extremely useful where small accessories have to be packed with the main component.

3.4 Fabrication of Bags — A single or double chain stitch is used and bags are generally sewn through two thicknesses of cloth. Bags made from bleached cloth can be sewn having raw edge or selvedge at mouth. Bags made from grey (unbleached) cloth are occasionally sewn with folded seams, that is, the two edges are folded over and stitched once through four thicknesses of cloth, or in very rare cases, twice. Lockstitch may also be supplied if specially desired. Grey bags may be supplied with raw edges at the mouth, but this is not recommended in view of the danger of unravelling.

3.5 Marking — Cotton bags may be marked, by machine or by hand, in one or more colours, in types or designs to suit users' requirements.

*Packaging of jute products in bales (*first revision*).

3.6 Closing — Closing is done by automatic stitching machines, or by hand using twine, or by wire ties. Seals may be attached if required. In the case of bags containing 25 kg or more, it is strongly recommended that 'ears' or lugs should be left for ease of handling.

4. MAN-MADE FABRIC SACKS (HDPE OR PP WOVEN SACKS)

4.1 General — High Density Polyethylene (HDPE) or polypropylene (PP) woven sacks and bags are generally used for packaging product such as fertilizers, powdered chemicals, foodgrains, plastic raw materials, sugar, etc. These have the advantage of strength as well as inertness. Reference may be made to IS : 8069 (Part 1)-1976* and IS : 8069 (Part 2)-1981* and IS : 6340-1971‡.

4.2 Terminology — The definitions and terms relating to man-made fabrics are given in IS : 1324-1966‡.

4.3 Materials — HDPE/PP sacks and bags are woven from HDPE/PP tapes. Details are given in Part 2/Sec 4 of the code.

4.4 Fabrication — The sack/bag may be fabricated from material woven as a tube and cut to required length or converted from woven material. When made from plain fabric the side and bottom are sewn and in case of tubular fabric the stitching is at the bottom only. Stitching is done in two rows of either lockstitch or chain stitch with a distance of at least 5 mm between the two rows and the outer layer at least 8 mm from the outer edge. Stitching should be done with fold over seam so that the stitches pass through a minimum of four layers of the fabric. HDPE/PP tape or any other suitable thread, compatible with the product being packed shall be used for stitching. The stitching shall be uniform without any loose threads or knots. The HDPE/PP tape used for stitching shall have at least 20 percent high denier than used for making the sacks. The mouth of the sack/bag shall be selvaged or hemmed. In case of hemming, it should be stitched with fold over seam to a depth of 25 mm with a single row of chain or lockstitch. A loose liner of LDPE or HMHDPE film may be provided inside the bag. Instead of a loose liner the HDPE/PP fabric may be laminated or extrusion coated with LDPE.

4.5 Marking — When a small number of sacks/bags are involved, silk screens or stencils are used for printing the matter. With a large number of sacks the method used is flexo-printing. The inks used for printing are those based on polyamide resins.

*High density polyethylene (HDPE) woven sacks for packing pesticides:
Part 1 Woven bags (*first revision*).
Part 2 Woven sacks (*first revision*).

‡High density polyethylene woven sacks.

‡Glossary of textile terms relating to man-made fibre and fabric industry.

5. BALES, TRUSSES AND BUNDLES

5.1 General — A bale is a package of supplies, often highly compressed, which may be:

- a) tied with rope or cord or secured with wire, metal strapping or hoop iron;
- b) protected by one or more coverings and stitched up in the outer cover; and
- c) protected by one or more coverings, stitched up in the outer cover and tied or strapped.

Baling is usually confined to compressible articles such as are not likely to be damaged or spoilt by compression. Press packing of bales reduces their volume, thus effecting a saving in shipping and warehousing space, and to some extent in handling and packing costs. The word truss is largely synonymous with bale, but as a rule 'truss' is used to denote smaller and less highly compressed packages. A bundle is an assembly of articles secured together and only subjected to manual pressure. Bundles may be enclosed in some form of covering or several bundles assembled together and baled, with or without compression.

5.2 Size — The factors to be borne in mind when deciding upon the size of a bale are the nature of the materials to be packed, the pressure to be applied, and the handling facilities at the destination. In some cases, owing to transport or other difficulties, bales can only be accepted if they weigh say 50 kg or less; in other cases, bales of say 750 kg and over are also acceptable.

5.3 Press Packing

5.3.0 The sequence of operations in press packing of bales is as follows:

- a) Preparation and collection of materials or goods;
- b) Placing the lower portion of the coverings in position on the press;
- c) Placing the materials or goods to be packed on these coverings on the bale press;
- d) Positioning the upper half of the coverings on the goods;
- e) Applying pressure;
- f) Sewing outer covering and forming 'ears' for handling, if required;
- g) Positioning and securing wire, ropes, straps or hoops;
- h) Releasing pressure; and
- j) Applying markings.

5.3.1 Preparation and Collection of Materials or Goods — The size and compression of the individual bales having been decided upon, the quantity of material or number of articles, bundles or parcels to be packed in each bale is determined on previous experience. Articles such as shirts, drawers, pillow cases, towels, sweaters, combination overalls denim trousers, coats or gloves, should be carefully folded and firmly tied into bundles suitable for packing. Usually 10 single articles or 10 pairs of the same size are bundled together, but if the resultant bundle is deeper than the width, 5 single articles or 5 pairs of the same size make a more satisfactory bundle.

Many articles will previously be parcelled in transparent film or other wrapping papers. They may be labelled and closed with gummed paper tape, cloth tape or twine. If the individual parcels are labelled or sealed with gummed paper tape, care must be taken to ensure that the paste or gum is perfectly dry before baling, otherwise mildew is likely to develop in tropical climates. If the individual parcels are tied with tape or string, the knots must be at the ends of the parcels to prevent their cutting into other parcels when pressure is applied.

Great care must be taken in folding and bundling articles to ensure that:

- a) extra bulky parts are not placed on top of one another; and
- b) buckles and buttons are staggered so that they do not damage the garments or themselves become broken or bent when the bale is compressed.

The requisite number of articles or bundles to be packed in each bale are then assembled at the bale press.

5.3.2 Coverings — In some cases, such as hay, raw jute, secondhand bags, etc, bales are subjected to compression and banding only and have no protective covering. As a general rule, however, bales are covered with various kinds of paper and jute cloth with a view to protecting the contents from moisture, dirt, insects, sunlight, careless handling, pilfering, abrasion, etc, the degree of protection being governed by the probable exposure of the bale to the above mentioned hazards, and by the destination.

5.3.3 Forming the Bale — The positioning of the goods on the bale press is one of the most important operations. Firm, compact, neat and uniform bales can only be made if:

- a) when bundles or parcels are used, the goods have been carefully assembled as indicated in **5.3.1(a)** and (b) above;

- b) the contents of the bale are carefully formed and piled before compression, and bulky parts, buttons, buckles, etc, staggered. The 'brick' method of piling is recommended (see Fig. 7).
- c) certain articles, such as pillows, bolsters, etc, are built up within a form or mould 'box-bales', in order to hold the package in shape;
- d) 'joints' between individual articles or packages are staggered in order to prevent straps from cutting the bale covering and injuring the contents. If long storage is expected, it is essential to include in the bale a preparation to prevent insect or moth damage.

5.3.4 Compression — The goods having been satisfactorily stacked on the lower portion of the covering in the bale press, the top layers of covering are positioned, and pressure applied; as saving of space is one of the objects of baling, bales should be of the maximum density consistent with the protection of the contents. Ordinarily, only commodities which admit of a certain amount of compression should be baled, and the density or compression should be studied carefully. Pressure may vary from 40 kgf/cm² to 310 kgf/cm². The heaviest pressure is used only on certain classes of goods in order to save shipping space; some materials would split under heavy pressure. The amount of compression desirable depends entirely upon the nature of the goods, for instance, piece goods will stand high compression, mosquito curtains a lesser degree, and sleeping bags stuffed with kapok or wool very little. Sleeping bags and similar stuffed articles should, therefore, not be baled except in circumstances where the saving of space is imperative.

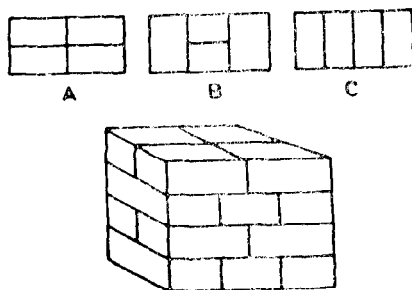


FIG. 7 ' BRICK ' METHOD OF PILING

5.3.5 Closing the Bale by Sewing — As a general rule, it is recommended that bale covering be sewn with strong twine at the sides and ends, with stitches approximately 5 cm in length. Where 'ears' are required to facilitate handling and reduce the risk of damage resulting from the use of hooks by dock labourers, etc, not less than 12 cm of hessian should be gathered together at each of four corners and securely sewn to form 'ears' as shown in Fig. 8. All ends of twine should be tied or otherwise securely fastened.

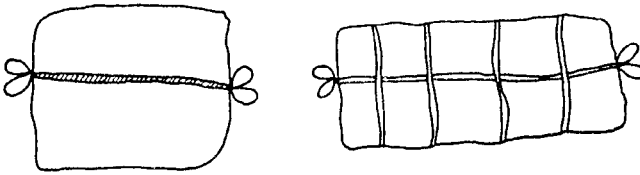


FIG. 8 'EARS' ON BALES

5.3.6 Position Strapping, Banding or Hoops — Rope, wire, steel strapping and hoop iron are commonly used for securing bales.

5.3.6.1 Rope — An objection to rope is that it contracts in damp weather and loosens as it becomes drier; it can also be gnawed by rats.

5.3.6.2 Wire — Wire is satisfactory for low-grade merchandise, waste materials, raw materials, woodpulp, rags, hay and other articles which will not deteriorate in value if the wire cuts into the bale.

5.3.6.3 Strapping — Strapping used should be in accordance with Part 3/Sec 3 of this code. Hot or cold-rolled flat steel strapping is satisfactory for most bales. It should normally be cold-rolled high tensile steel 16 mm wide, not less than 0.50 mm thick and should be treated to prevent rust. When applying steel strapping, the two outside straps should be approximately 100 mm from each end, and the intermediate straps placed equidistant from one another and from the end straps. Straps should be applied by a mechanical stretching tool, and must be stretched so tightly that the compression of the bale will be held and the straps remain in place without slipping over the ends of the bale when the pressure is released. The ends of straps may be sealed with a metal sleeve or seal designed to be either punched or crimped. Loose ends of the straps should be folded under, and cut or broken off, so that no edges project which are liable to cause damage to goods or injury to person. A piece of bitumenized hessian or similar material should be placed round the fastening of straps before the pressure is released, in order to prevent damage to the contents of the bale or any other materials with which they may come in contact.

5.3.6.4 Hoops — In the case of bales of exceptional size or weight, hot rolled hoop iron should be used, not less than 25 mm wide (1·0 mm thick) and painted to prevent rust. The hoops should be fastened by metal studs or buckles which must be fixed while the bale is under pressure. The positioning of the hoops and protection at the fastening is similar to that recommended for straps.

5.3.7 Releasing Pressure and Marking — The pressure is now released, the bale moved from the press and the necessary marking applied with a brush, stencil or stamp. Waterproof ink or paint should be used. A penetrating fluid which will soak through the coverings and injure the contents should not be used. Suppliers of marking inks or paints are usually in a position to recommend what is suitable for any given purpose. Tags are not recommended for marking bales, but if used should have reinforced metal eyelets and be attached with blunt-ended fasteners or suitable wire.

5.3.7.1 All markings should be clear and distinct and caution marks such as ‘ USE NO HOOKS ’, ‘ KEEP DRY ’, etc, should be prominently placed.

5.3.7.2 The operation of press-packing of bales are subjected to modification in certain details when:

- a) no covering materials are used; and
- b) pressure is low and no straps are required.

5.4 Trusses and Bundles — The operations of press-packing of bales apply equally to trusses and bundles, subject to modifications when:

- a) no covering materials are used;
- b) pressure is low and no straps are required; and
- c) no pressure other than manual pressure is applied.